

### **Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

### **Listing of Claims:**

Claim 1 (currently amended): A method for a processor to color ~~matching~~ match a first image and a second image, wherein a first region of the first image and a second region of the second image overlap, the method comprising:

generating a first histogram of the first region;

generating a second histogram of the second region;

determining corresponding pixel values from the first and the second histograms;

determining at least one parameter of an optoelectronic conversion function (OECF) that best matches the corresponding pixel values; and

color matching the second image to the first image by applying the OECF with the at least one parameter to the second image.

Claim 2 (original): The method of claim 1, further comprising, prior to said generating a first histogram and generating a second histogram:

removing a percentage of the overlapping pixels with the greatest difference in brightness.

Claim 3 (original): The method of claim 1, wherein:

said generating a first histogram comprises recording in a first plurality of pixel value bins a first plurality of numbers of pixels that have respective pixel values in the first region; and

said generating a second histogram comprises recording in a second plurality of pixel value bins a second plurality of numbers of pixels that have the respective pixel values in the second region.

Claim 4 (previously presented): The method of claim 3, wherein said determining corresponding pixel values from the first and the second histograms comprises generating a lookup table (LUT) storing a third plurality of numbers of pixels and their corresponding pixel values.

Claim 5 (original): The method of claim 4, wherein said generating a lookup table comprises:

- (1) initializing all entries in the LUT to 0;
- (2) initializing a first loop by setting  $i = 0$ ;  $j = 0$ ;  $rem1 = h1[0]$ ; and  $rem2 = h2[0]$ ;
- (3) updating the LUT by setting  $min\_rem = \min(rem1, rem2)$ ;  $rem1 = rem1 - min\_rem$ ; and  $rem2 = rem2 - min\_rem$ ; and incrementing  $LUT[i][j]$  by  $min\_rem$ ;
- (4) if  $rem1 = 0$ , then incrementing  $i$  and setting  $rem1 = h1[i]$ ;
- (5) if  $rem2 = 0$ , then incrementing  $j$  and setting  $rem2 = h2[j]$ ;
- (6) if  $i < 256$  and  $j < 256$ , then repeating steps (3) to (5);

wherein  $h1[]$  is the number of pixels having a certain pixel value in the first histogram,  $h2[]$  is the number of pixels having a certain pixel value in the second histogram, and  $LUT[][]$  is the number of pairs of corresponding pixel values having a certain pixel value in the first histogram and a certain pixel value in the second histogram.

Claim 6 (original): The method of claim 5, wherein said determining at least one parameter of an OECF comprises minimizing a color matching error, the color matching error being defined as:

$$e = \sum_{i=0}^{255} \sum_{j=0}^{255} LUT[i][j] ((i+1)/256.0 - S^{-1}(\tau S((j+1)/256.0)))^2,$$

wherein  $e$  is the color matching error,  $\tau$  is a color matching parameter, and  $S()$  is the OECF.

Claim 7 (original): The method of claim 6, wherein the OECF is defined as:

$$S(x) = x + \frac{2}{\pi} \arctan\left(\frac{a \sin(\pi x)}{1 - a \cos(\pi x)}\right),$$

wherein  $x$  is a pixel value normalized to (0,1), and  $a \in (-1,1)$  is another color matching parameter.

Claim 8 (original): The method of claim 7, wherein said minimizing a color matching error comprises performing a golden section search of the color matching error.

Claim 9 (original): The method of claim 8, wherein said performing a golden section search comprises:

- (1) initializing the another color matching parameter and a minimum color matching error;
- (2) performing the golden section search with the another color matching parameter being fixed and the color matching parameter being varied to determine a smallest color matching error achieved;
- (3) recording values of the color matching parameter and the another color matching parameter that achieve the smallest color matching error if it is less than the minimum color matching error;
- (4) setting the minimum color matching error equal to the smallest color matching error; and
- (4) repeating steps (2) to (4) for a range of values of the another color matching parameter.

Claim 10 (previously presented): The method of claim 6, wherein said applying the optoelectronic conversion function comprises:

$$x_c = S^{-1}(W(\tau, x_o)S(x_o)),$$

wherein  $x_o$  is an original pixel value in the second image,  $x_c$  is a corrected pixel value in the second image,  $S^{-1}()$  is the inverse of the OECF, and  $W$  is a weight function defined as:

$$W(\tau, x_o) = \tau + (1 - \tau)x_o.$$

Claim 11 (original): The method of claim 1, wherein the OECF is defined as:

$$S(x) = x + \frac{2}{\pi} \arctan\left(\frac{a \sin(\pi x)}{1 - a \cos(\pi x)}\right),$$

wherein  $S()$  is the OECF,  $x$  is a pixel value normalized to (0,1), and  $a \in (-1,1)$  is a first color matching parameter.

Claim 12 (original): The method of claim 11, wherein said determining at least one parameter of an OECF comprises minimizing a color matching error defined as:

$$e = \sum_{x_1 \in R_1, x_2 \in R_2} \|x_1 - S^{-1}(\tau S(x_2))\|^2,$$

wherein  $e$  is the color matching error,  $x_1$  and  $x_2$  are corresponding pixel values in the first and the second regions,  $R_1$  and  $R_2$  are the first and the second regions,  $S()$  is the OECF,  $S()^{-1}$  is the inverse OECF, and  $\tau$  is a second color matching parameter.

Claim 13 (original): The method of claim 12, wherein said minimizing a color matching error comprises performing a golden section search of the color matching error.

Claim 14 (original): The method of claim 13, wherein said performing a golden section search comprises:

- (1) initializing the first color matching parameter and a minimum color matching error;
- (2) performing the golden section search with the first color matching parameter being fixed and the second color matching parameter being varied to determine a smallest color matching error achieved;
- (3) recording values of the first and the second color matching parameters that achieve the smallest color matching error if it is less than the minimum color matching error;
- (4) setting the minimum color matching error equal to the smallest color matching error; and
- (4) repeating steps (2) to (4) for a range of values of the first color matching parameter.

Claim 15 (previously presented): The method of claim 12, wherein said applying the OECF comprises:

$$x_c = S^{-1}(W(\tau, x_o)S(x_o)),$$

wherein  $x_o$  is an original pixel value in the second image,  $x_c$  is a corrected pixel value in the second image, and  $W$  is a weight function defined as:

$$W(\tau, x_o) = \tau + (1 - \tau)x_o.$$

Claim 16 (currently amended): A method for a processor to color matching match a first image and a second image, wherein a first region of the first image and a second region of the second image overlap, the method comprising:

removing a percentage of overlapping pixels with the greatest difference in brightness;

generating a first histogram of the first region and a second histogram of the second region after said removing;

histogram matching the first and the second histograms to determine corresponding pixel values from the first and the second histograms;

minimizing a color matching error between the corresponding pixel values, wherein the color matching error is generated from an optoelectronic conversion function (OECF); and

color matching the second image to the first image by applying the OECF to the second image.

Claim 17 (original): The method of claim 16, wherein said histogram matching the first and the second histograms comprises generating a lookup table (LUT) as follows:

(1) initializing all entries in the LUT to 0;

(2) initializing a first loop by setting  $i = 0$ ;  $j = 0$ ;  $rem1 = h1[0]$ ; and  $rem2 = h2[0]$ ;

(3) updating the LUT by setting  $min\_rem = \min(rem1, rem2)$ ;  $rem1 = rem1 - min\_rem$ ; and  $rem2 = rem2 - min\_rem$ ; and incrementing  $LUT[i][j]$  by  $min\_rem$ ;

(4) if  $rem1 = 0$ , then incrementing  $i$  and setting  $rem1 = h1[i]$ ;

(5) if  $rem2 = 0$ , then incrementing  $j$  and setting  $rem2 = h2[j]$ ;

(6) if  $i < 256$  and  $j < 256$ , then repeating steps (3) to (5);

wherein  $h1[]$  is the number of pixels having a certain pixel value in the first histogram,  $h2[]$  is the number of pixels having a certain pixel value in the second histogram, and  $LUT[][]$  is the number of pairs of corresponding pixel values having a certain pixel value in the first histogram and a certain pixel value in the second histogram.

Claim 18 (previously presented): The method of claim 17, wherein the color matching error is defined as:

$$e = \sum_{i=0}^{255} \sum_{j=0}^{255} LUT[i][j]((i+1)/256.0 - S^{-1}(\tau S((j+1)/256.0))),$$

wherein  $e$  is the color matching error,  $\tau$  is a color matching parameter, and  $S()$  is the OECF defined as:

$$S(x) = x + \frac{2}{\pi} \arctan\left(\frac{a \sin(\pi x)}{1 - a \cos(\pi x)}\right),$$

wherein  $S()$  is the OECF,  $x$  is a pixel value normalized to (0,1), and  $a \in (-1,1)$  is another color matching parameter.

Claim 19 (original): The method of claim 18, wherein said minimizing a color matching error comprises performing a golden section search of the color matching error comprising:

- (1) initializing the another color matching parameter and a minimum color matching error;
- (2) performing the golden section search with the another color matching parameter being fixed and the color matching parameter being varied to determine a smallest color matching error achieved;
- (3) recording values of the color matching parameter and the another color matching parameter that achieve the smallest color matching error if it is less than the minimum color matching error;
- (4) setting the minimum color matching error equal to the smallest color matching error; and
- (5) repeating steps (2) to (4) for a range of values of the another color matching parameter.

Claim 20 (previously presented): The method of claim 19, wherein said applying the OECF to the second image comprises:

$$x_c = S^{-1}(W(\tau, x_o)S(x_o)),$$

wherein  $x_o$  is an original pixel value in the second image,  $x_c$  is a corrected pixel value of the second image, and  $W$  is a weight function defined as:

$$W(\tau, x_o) = \tau + (1 - \tau)x_o.$$